

# **Developing and Assessing a New Composite Fed Cattle Value Report**

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Final Report Submitted to  
Agricultural Marketing Service  
United States Department of Agriculture

November 15, 2017

\* We acknowledge funding support from Agricultural Marketing Service (AMS), United States Department of Agriculture (USDA). All opinions expressed are solely those of the authors and not those of AMS or USDA.

## Executive Summary

Evolving fed cattle pricing methods and changing market structure motivate ongoing efforts to provide market information that is timely and useful in price discovery. Traditional negotiated cash cattle markets have rapidly gone from the dominant pricing system to representing less than 30% of fed cattle trade while formula trade has increased markedly. These changes make interpreting and using price reports more challenging. This creates an opportunity to explore combining transactions from different cattle pricing methods to develop a new composite fed cattle value report. The purpose of this study was to develop and assess potential of reporting a combined composite fed cattle price or value using existing Livestock Mandatory Reporting (LMR) data collected by USDA-AMS.

Our findings and recommendations from this project are:

1. USDA-AMS has recently began reporting a *Weekly Fed Cattle Comprehensive Report* that combines 1) negotiated cash, 2) formula net, 3) forward contract net, and 4) negotiated grid net prices to provide weekly dressed and live price reports. This is a major step towards accomplishing the goal of providing a comprehensive composite price report. However, depending on the purpose of the *Comprehensive* report, we recommend possible changes. If the purpose is to provide information to industry on the overall net price packers have paid for cattle during the past week, then including the four purchase types as AMS currently is doing in the *Comprehensive* report is recommended. However, if the intended purpose is to help facilitate daily and weekly price discovery, we recommend not including forward contract purchases in the *Comprehensive* price report. Forward contracts can have prices set several weeks or months prior which are not representative of current market conditions and including these in with more current prices can distort information for price discovery. A caveat is that we also do not know the date base prices are established in formula agreements either. However, the correlation of first-differenced weekly weighted-average formula dressed base price with the previous week's first-differenced average negotiated dressed price in 2016 was 0.68 and 0.69 with two-week lagged cash price, suggesting formula base prices are strongly associated with the previous two week's negotiated cash prices. In contrast, first-differenced forward contract dressed prices had a correlation of only 0.09 with prior week's and 0.04 with two-week prior differenced negotiated dressed prices.
2. We develop and illustrate a combined composite price report that includes all live and dressed negotiated cash, formula net, and negotiated grid net purchases into a single dressed-basis value and a parallel series that is converted to a live-weight-basis composite value. Such a price report provides a single daily and weekly comprehensive reference dressed and live value each of which includes all recently priced fed cattle purchases into a dressed and comparable live composite value. We also illustrate reporting price percentiles (e.g., 15<sup>th</sup> and 85<sup>th</sup> percentile price ranges) to illustrate price variation. We argue this is more informative than simple minimum and maximum prices which can result from extreme outcomes that are not representative transactions.

3. We develop and illustrate use of a way to summarize factors contributing to observed price ranges for dressed formula net and negotiated grid net prices. Our findings illustrate summarizing premiums and discounts is feasible and useful on monthly and quarterly time frames. We recommend exploring further the use of such models for reporting premium and discount summaries weekly and monthly to facilitate price discovery. Such information would complement the combined composite price report we develop to provide users with more information about price differentials.
4. Even with the detailed data provided in current LMR data, there are notable cattle price determinants that are not reported that would be useful in providing more accurate information to market participants on price differentials. For example, having more detailed quality grade information on percentages that are Prime, Upper Choice, Lower Choice, Select, and Standard; yield grade distributions; percentages of light- or heavy-weight carcasses; dark cutter incidence rates; number of 30-plus month-old cattle in a lot; and whether cattle are in a naturally raised program would all provide further data to inform the market about price differentials especially on dressed formula and negotiated grid net purchases.

## Introduction

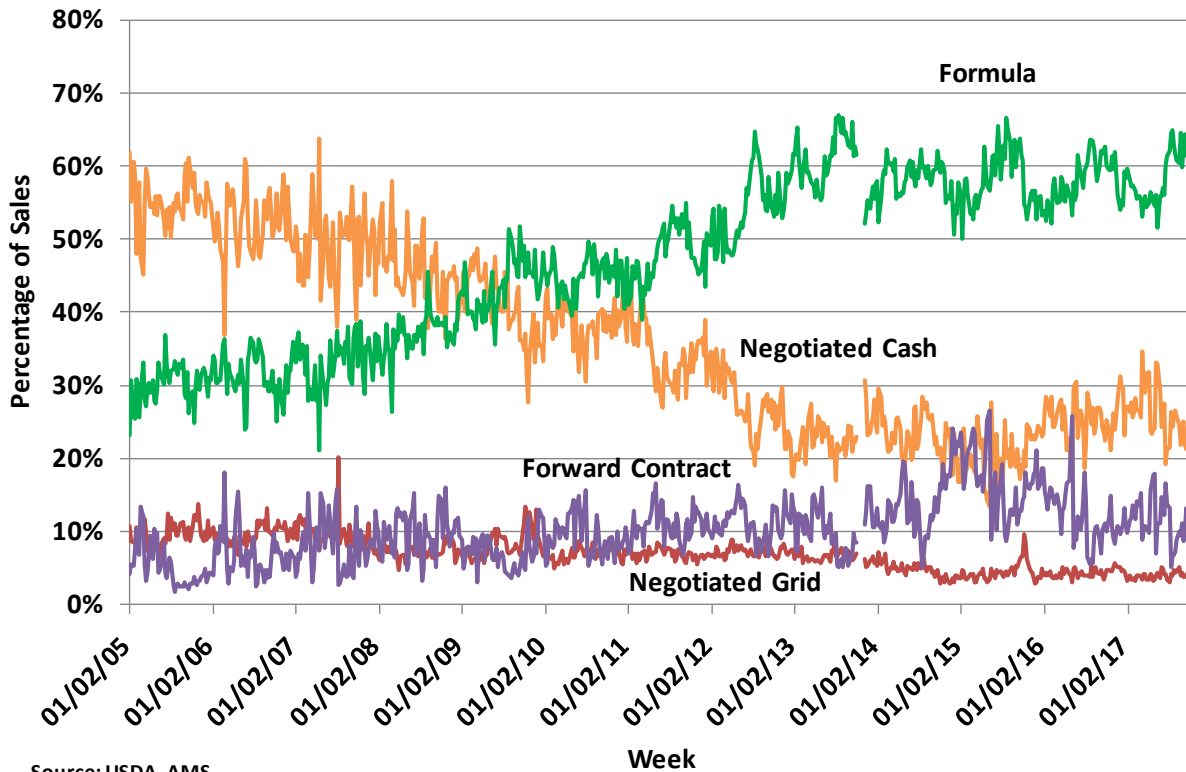
Reliable, representative, and trusted market price data is one of the most important sources of information for those negotiating transactions. Market participants rely heavily on access to readily available reported price and volume information as a starting point for price discovery. Reported price information also provides important market signals to participants influencing market timing, production, and resource allocation decisions. Markets without adequate or reliable price reports will be uninformed, and as a result, will not function well.

The fed cattle market has long relied upon the USDA Agricultural Marketing Service (AMS) to provide unbiased, reliable, readily available price reporting. Historically, among the most informative and relied upon AMS daily and weekly reports have been negotiated live and dressed fed steer and heifer prices. Negotiated price reports are not only important for facilitating price discovery, but they also are often used as base prices for fed cattle sold using formula pricing. As such, negotiated fed cattle price information reported by AMS is leveraged to value cattle well beyond just the negotiated cash market.

Over time the negotiated cash fed cattle market has seen declining volume as formula pricing especially has increased in popularity. Figure 1 summarizes weekly fed cattle trade volume shares by purchase method since 2005. Negotiated purchases represented 50-60% of typical weekly volume during 2005-06 but declined steadily to around 20-30% by 2013. In contrast, formula pricing increased from 30% in 2005-06 to 50-65% since 2013. With the increased prevalence of formula pricing, this segment has become a much more important component of the overall fed cattle market. Presently, AMS reports formula price information on a weekly basis in separate reports from negotiated cash purchases (with the exception of the recently introduced *Comprehensive* report). There is opportunity to combine fed cattle purchase transactions into a composite price report that provides an overall market valuation. This study is designed to assess this opportunity.

Several issues have surfaced regarding the dramatic change in the way fed cattle are priced. Among the most important issues are: 1) whether the cash negotiated market has become excessively thinly traded adversely affecting price discovery for fed cattle; 2) whether the negotiated market is representative of the type of cattle being sold across the entire market; and 3) whether pricing and volume information from negotiated purchases alone are adequate for informing fed cattle market participants on a daily or weekly basis. These issues are part of the motivation for this study with the main purpose of developing and assessing a potential fed cattle value index that could summarize daily and weekly fed cattle values across negotiated cash, negotiated grid net, and formula net fed cattle purchases thereby providing a single index value that provides a richer set of combined information than that contained in just negotiated cash transactions. In addition, we develop and evaluate a method that could be used to explain variation in prices realized and reported in formula cattle net purchases. The focus of our study is on non-breeding, beef type cattle with no assessment conducted here for price reporting for dairy-bred or cow transactions.

**Figure 1. Ways Domestic Fed Cattle are Purchased and Priced,  
Weekly January 2005 - October 8, 2017**



Source: USDA, AMS

### AMS Price Reports

Under livestock mandatory price reporting, required packers submit fed cattle purchase data to AMS twice daily, once at 10:00 a.m. and again at 2:00 p.m. Based on these packer data submissions, AMS publishes three different fed cattle morning summary and afternoon negotiated price reports for each of five major cattle feeding regions daily.

The five regional reports are direct trade markets for fed cattle originating from:

- 1) Colorado (CO)
- 2) Iowa-Minnesota (IA Region)
- 3) Kansas (KS)
- 4) Nebraska (NE)
- 5) Texas-Oklahoma-New Mexico (TX Region)

Three types of daily fed cattle price reports AMS publishes include:

- 1) *Summary Reports* for each of the five market regions published late morning (11:30 a.m. CT) each day summarizing the packer purchase information for negotiated cash

and negotiated grid base purchases from the previous day's submitted data (referred to as the previous day's *Summary Roundup*).

- 2) *Afternoon Reports* for each of five market regions published late afternoon (3:00 p.m. CT) each day summarizing packer purchase information for negotiated cash and negotiated grid base purchases from that day's afternoon trade submitted by packers (referred to as *Afternoon Trade so far today*).
- 3) *Weighted Average Reports* for each of five market regions published late morning (11:00 a.m. CT) each day summarizing packer negotiated purchase information from the data reported by packers at 2:00 p.m. the previous day and 10:00 a.m. the current day (referred to as *Recap*).

For the analysis completed in this report, price data from any of the three reports noted above could be used to compile a fed cattle value index in a very similar way to what we do here. For illustrative purposes, we conduct our analysis using only the same time frame that comprises the *Weighted Average Reports*. That is, we use purchase data provided in the previous day's 2:00 p.m. submission combined with the current day's 10:00 a.m. data submission to construct a daily value index.

### **USDA Weekly Fed Cattle Comprehensive Report**

After our study was already underway, USDA AMS in July 2017, announced development of a new fed cattle price report, the *Weekly Fed Cattle Comprehensive Report*. The *Comprehensive Report* combines purchase types of 1) negotiated cash, 2) formula net, 3) forward contract net, and 4) negotiated grid net prices into a single weekly dressed and separate live price report. The report also segregates dairy-bred from beef type animals in separate price reports. The *Comprehensive Report* represents a significant step towards attaining the goals of our current study. In particular, the *Comprehensive Report* provides separate weekly dressed and live basis comprehensive national market fed cattle head-weighted average prices and number of total head for >65% Choice, <65% Choice, and Total for all grades that combines the four purchase types.

Our study adds additional information and insight relevant to the newly developed *Comprehensive Report*. We highlight the following new information:

- 1) We illustrate that including forward contract net prices in a combined price report might deserve additional thought especially if the purpose of the report is to facilitate price discovery.
- 2) We present the value of, and illustrate, combining dressed and live purchases together into a combined overall composite daily and weekly fed cattle value index.
- 3) We illustrate use of percentiles to report price variation which is more useful than minimum and maximum prices.
- 4) We develop and illustrate a daily comprehensive price report to supplement the weekly and we propose a 2-day rolling average report.

- 5) We develop and test a method and illustrate potential use to report price differential information associated with dressed formula and negotiated grid net purchase prices to explain the range of prices observed.

### **Development of a Fed Cattle Value Index**

To develop a composite fed cattle value index (FCVI) we started with a conceptual model that we designed to provide a condensed information-rich daily or weekly fed cattle value index with associated value differentials associated with various fed cattle transaction attributes.

The first step in this procedure was an assessment of the data available from which to build such an index. The data collected daily from beef packers by AMS under LMR include:

1. The purchasing packing plant
2. The source of the cattle (domestic or imported)
3. The type of purchase (formula, negotiated cash, negotiated grid, or forward contract)
4. Whether the transaction reported is a base or a net price for grids, formula, and forward contract trade
5. The class of cattle (steers, heifers, mixed steers/heifers, dairy-bred steer/heifer and/or cow)
6. The purchasing basis (dressed or live)
7. The pricing point (FOB feedlot or delivered to packer)
8. The head count in the transaction
9. The estimated or actual average live or dressed weight per head
10. The price (\$/cwt) either live or dressed
11. The percentage grading Choice or higher quality
12. A grade classification overall for transaction (Choice, Select, Standard)
13. An estimated or actual average dressing percentage
14. The state of origin of the cattle
15. Noted premiums or discounts for grid or formula cattle
16. Whether the pen had packer financing
17. Who made (packer or feedlot) delivery date and location description
18. Whether the delivery is 1-14 or 14-30 days where relevant
19. The reporting date and the reporting time (10:00 a.m. or 2:00 p.m.)

The first choice to be made was what purchase types to include in the FCVI calculation process. To provide daily and weekly value indexes that as closely represent current market conditions, without double counting transactions, we included the following purchase classifications in our models:

1. Negotiated cash
2. Formula net
3. Grid net

We eliminated forward contracts from our modeled data to create our FCVI because the day the base price is established in a forward contract can be months prior to the actual delivery and this date is not recorded in LMR data. As such, forward contract prices cannot be matched

with the dates in the purchase types included in our model. That is, a negotiated cash purchase this week does not match temporally with the timing of a typical forward contract. AMS currently includes forward contract net prices in the *Weekly Fed Cattle Comprehensive* report. We illustrate below why this can result in temporal mismatched prices and we advise against including forward contract net prices in this type of composite price report if the purpose of the report is to facilitate price discovery.

Base prices for formula, grid, and forward contract purchases are also collected by AMS, but base prices are not useful for providing a fed cattle value index as they exclude any premiums or discounts paid once the pen is delivered. Sources of base prices also vary as do applied premium and discount schedules to arrive at net prices. As such, base prices are not always comparable across packers or even different plants from the same packer. Further, cattle with base prices only reported are later reported when the cattle are delivered in net prices so including base prices in our model would double count these transactions.

Next was the decision on whether to include both domestic and imported purchases in our model. We elected to retain both sources of cattle in our data consistent with what AMS does in the *Weekly Fed Cattle Composite*. Imported fed steer and heifer slaughter purchases represent a very small portion of overall purchases (around 1% of total federally inspected slaughter based on USDA slaughter data) so including them does not have a large impact.

We explore separate price reports for dressed and live (similar to the *Weekly Fed Cattle Composite*) and we propose development of a new single composite that combines both dressed and live purchases by converting the live price to a dressed price basis by dividing the live price by the dressing percentage. We include both FOB and delivered transactions in our price calculations. We do not consider minor possible pricing influencing issues of whether packer financing was involved; the delivery location or delivery date decision maker (packer or feeder); and the days to delivery.

Table 1 summarizes the transactions that we include overall in our combined composite fed cattle value index reported later.

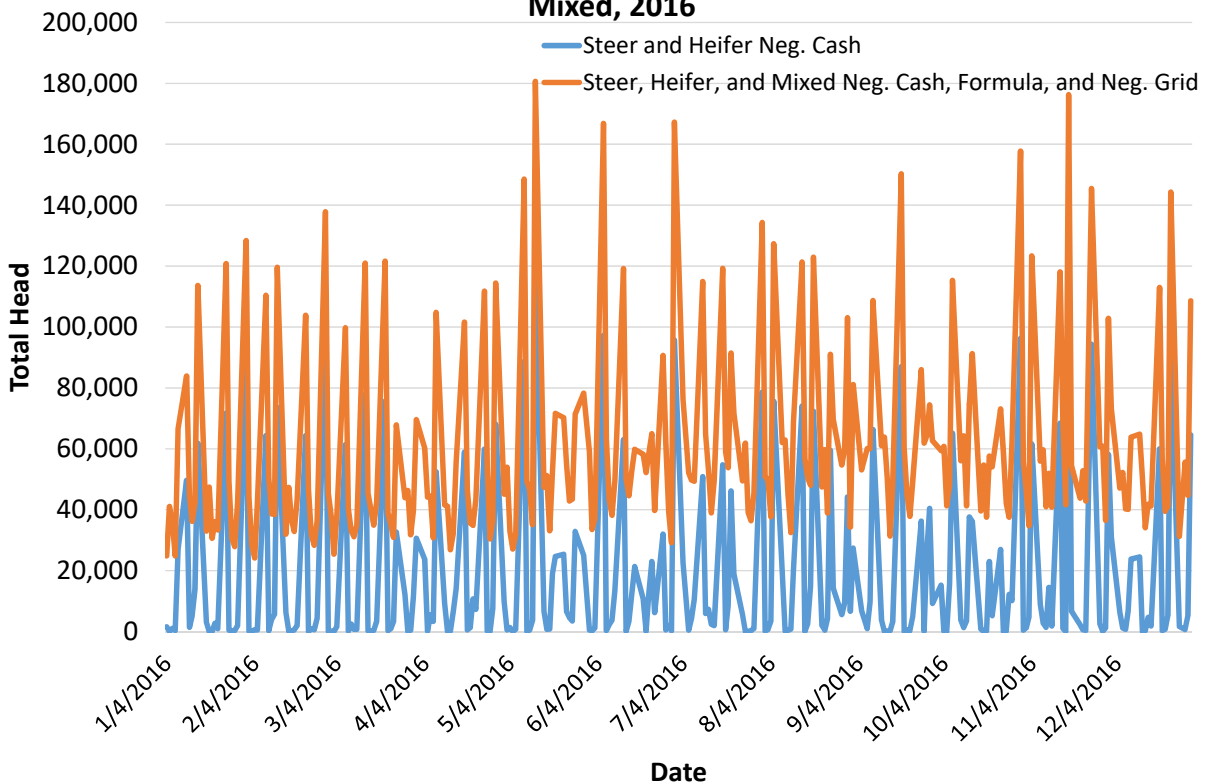


**Table 1. Transaction Types Included in Comprehensive Fed Cattle Value Calculation**

Category	Transaction Types Included
Cattle Sources	Domestic Imports
Purchase Types	Negotiated Cash Formula Net Negotiated Grid Net
Purchasing Basis	Live Dressed
Purchasing Basis Shipment	Delivered FOB
Cattle Class (beef type only)	Steers Heifers Mixed Steers/Heifers
States of Origin	All including imports
Delivered Time	1-14 days 15-30 days

The FCVI model uses daily transaction data that combines live and dressed; FOB and delivered; steer, heifer, and mixed steer/heifer; and negotiated cash, formula net, and negotiated grid net transactions for the national market. Figure 2 compares daily volume of just steer and heifer negotiated cash purchases (dressed, live, FOB, and delivered combined) with the combined volume used in our FCVI model. During 2016 daily volume varied notably from a minimum of zero head to a maximum of 115,629 head in negotiated cash and from a minimum of 36,055 to maximum of 202,614 head from the combined FCVI model data. An average of 16,873 head were transacted for just negotiated steers and heifers across the national market each day compared with an average 80,099 head in the combined data. This provides a comparison of the number of cattle that can be represented in a daily combined FCVI developed here in contrast to using only negotiated steer and heifer transactions.

**Figure 2. Daily National Beef Breed Head Cash Steer and Hieffer vs. Negotiated Cash + Formula Net + Negotiated Grid Net Steer, Heifer, and Mixed, 2016**



## **FCVI Model Results**

We present our analysis using three different data aggregation schemes:

1. *Daily Model*: The model was estimated daily using the transactions from the 2:00 p.m. data submission from the prior day and the 10:00 a.m. submission from today (i.e., the report day).
2. *2-Day Rolling Model*: The model was estimated using the daily data from 1 above but using a two-day rolling average of these data, so each model contained today's plus the previous report day's data.
3. *Weekly Model*: The model was estimated using all transactions for the past week which consistent with AMS includes data from the afternoon report the previous Monday through the Monday reporting day's morning report – this model could be estimated as a rolling weekly model, but consistent with the way AMS currently reports weekly price reports one time per week, we report this just one time per week for the entire week's purchases as opposed to having a rolling weekly (e.g., 5- or 6-day) report each day.

Because the *Daily* and *2-Day Rolling Models* were each estimated every day, during 2016 there are potentially a total of 255 transaction day reports. As such, 255 daily reports were estimated for each method. The *Weekly Model* represents 52 weekly reports during 2016.

## **Exclusion of Forward Contract Net Prices**

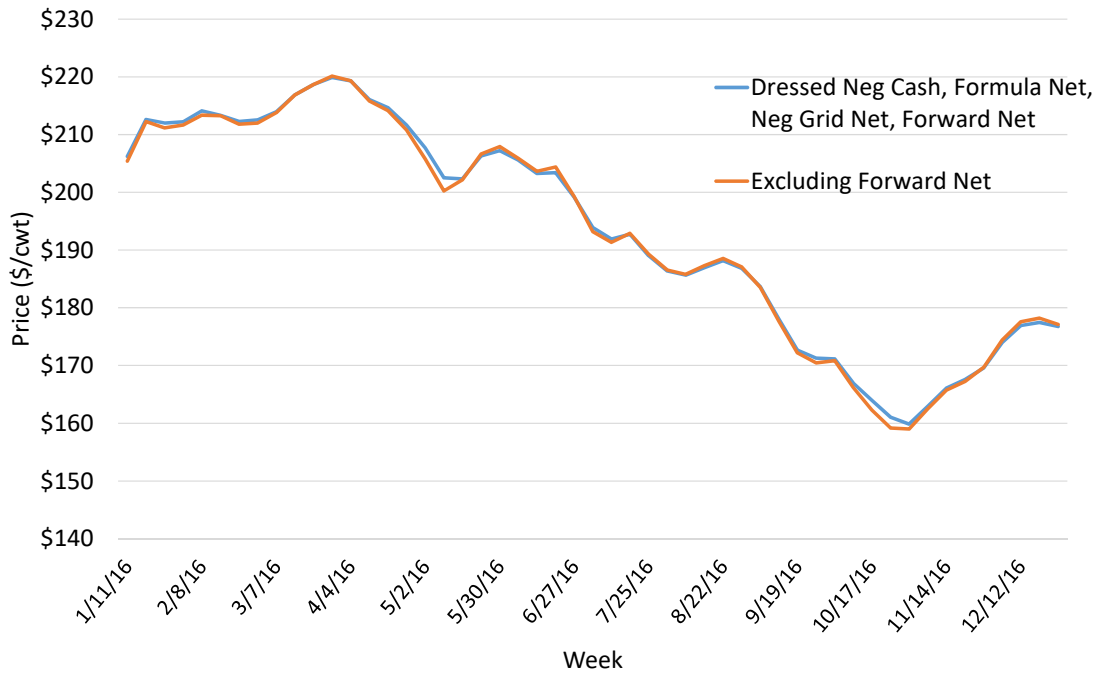
We recommend not including forward contract net prices in reporting daily or weekly comprehensive fed cattle prices. We illustrate why here. We calculated weekly beef type national weighted-average dressed and live steer, heifer, and mixed steer/heifer prices with and without including forward contract net prices. Forward contract base prices can be established over a long time window that could include up to several months. As such, forward contract net prices, while reflecting what packers are paying net for cattle being slaughtered this week, do not reflect today's or this week's fed cattle market. That is, forward contract prices represent expectations about today's market at the time the contract price was set potentially several months earlier. As such, including forward contract net transactions result in convoluting the time period of the prices being reported with current and potentially several months lagged prices. If the purpose of the price report is to facilitate and inform price discovery, including forward contract purchases is not advised. If the purpose is to provide a summary of the price of all cattle packers slaughtered the prior week, including forward contracts is justified. Our study focuses on price discovery.

To determine how much including forward contracts in weighted-average price report impacts reported prices we compare weekly national weighted-average prices for beef type cattle including and excluding forward contract net transactions in the price calculation. Figure 3 illustrates during 2016 the two dressed weighted-average prices and Figure 4 shows the same for live prices. At first glance, the price series that include forward contract net prices appear similar to those that exclude these transactions in the price calculation.

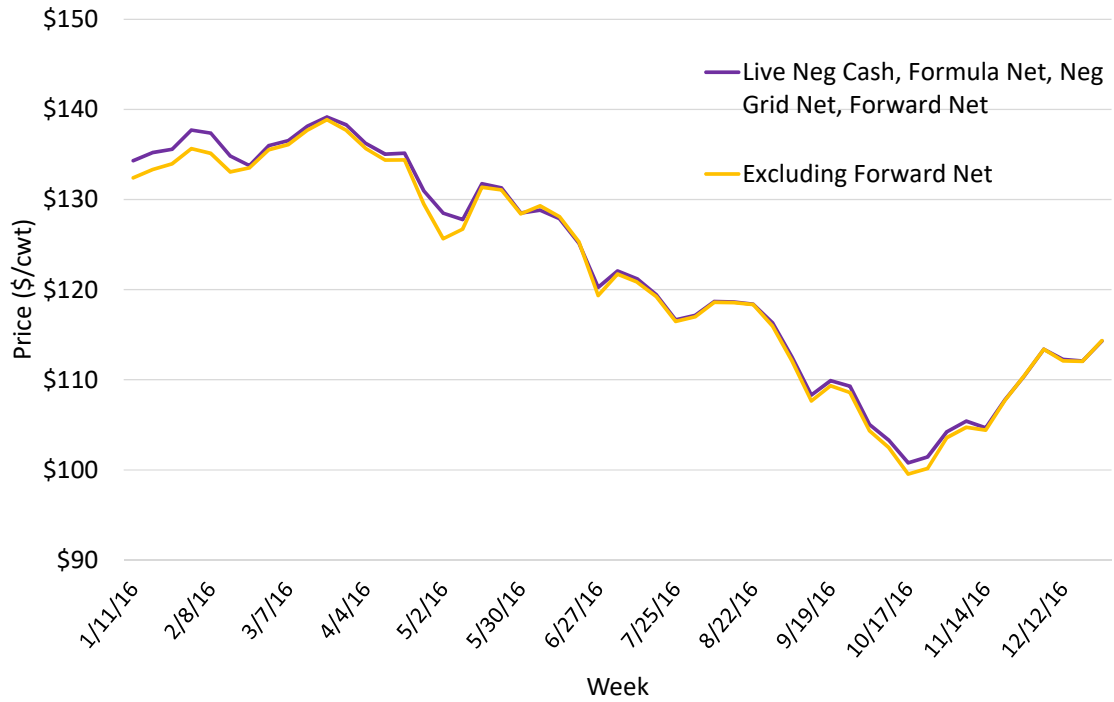
However, taking the differences between the two alternative weighted-average series makes the impact of including forward contract transactions much more obvious. Figure 5 provides

the difference (the weighted-average price including forward contract net transactions minus the weighted-average price excluding them) in the live and dressed weighted-average series from Figures 3 and 4. During some weeks including forward contracts in the weighted average resulted in a weighted-average price that was more than \$2/cwt higher than excluding these transactions. In a declining market, as we were experiencing during much of 2016, forward contract prices are likely higher than spot prices and vice-versa in a rising market. As such, including forward contract prices results in a reported weighted-average price that is not a recently established price and thus these prices do not fully represent current market conditions. For this reason, if the purpose of a comprehensive price report is to summarize recently discovered prices, we advise against including forward contract net prices in the comprehensive price calculation.

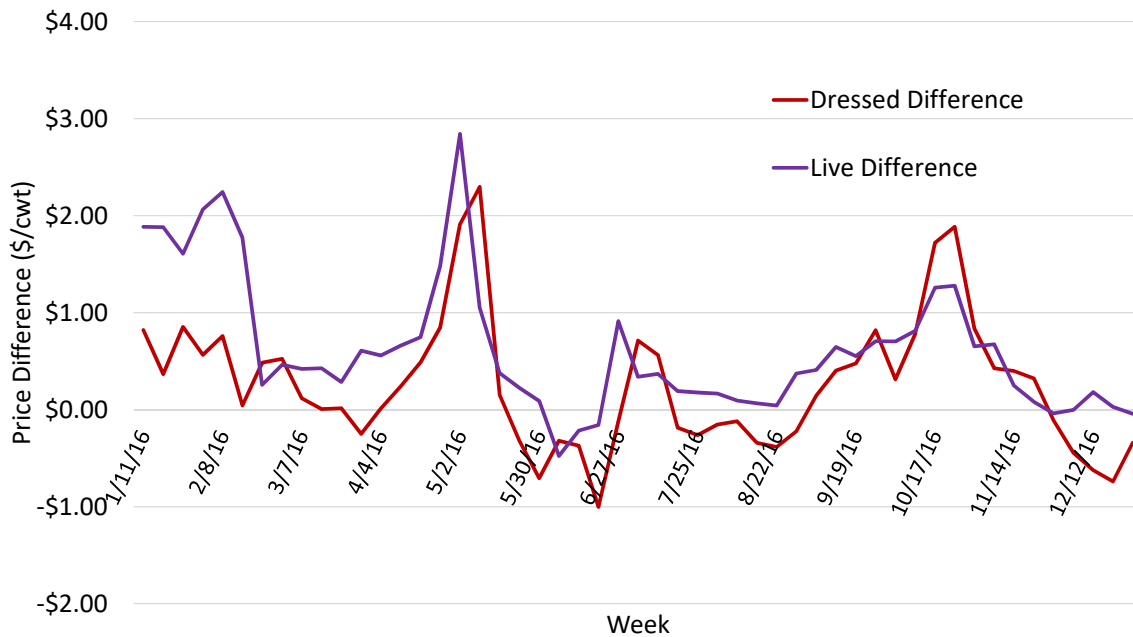
**Figure 3. Weekly Weighted Average Dressed Beef Cattle Steer, Heifer, and Mixed Steer/Heifer Prices for all Net Prices and Excluding Forward Contract Net, 2016**



**Figure 4. Weekly Weighted Average Live Beef Cattle Steer, Heifer, and Mixed Steer/Heifer Prices for all Net Prices and Foward Contract Net Only, 2016**



**Figure 5. Weekly Difference in Weighted Average Beef Cattle Steer, Heifer, and Mixed Steer/Heifer Live and Dressed Prices for all Net Prices Minus all Net Excluding Foward Contract Net, 2016**



## Weekly FCVI Calculation Report

We started with assessment of developing a weekly weighted-average composite calculation. We selected two different weeks in 2016 to illustrate how such a combined report might look. Tables 2 and 3 illustrate weekly price reports for beef type steers, heifers, and mixed steers/heifers for weeks that span from the afternoon report of the previous Monday through the Report Date Monday morning report (consistent with the USDA *Weekly Fed Cattle Comprehensive*). The reports in Tables 2 and 3 include net prices for negotiated cash, net negotiated grid, and formula net prices for the national market (forward contract net prices are excluded for reasons discussed previously). The objective of this type of price report is to provide as temporally consistent of an aggregate fed cattle price report summary as current LMR data allow.

From a very broad perspective this report provides a quick assessment of overall national fed cattle composite values, a percentile range in these values, the dressing percentage and percentage Choice in the population of transactions, the number of head involved, and a brief comparison of the split between dressed and live purchases that comprise the combined composite. This report provides a tremendous amount of information about that past week's fed cattle market.

The bold numbers in the report are the most comprehensive values reported as they combine all dressed and live purchases together by converting the live to dressed and calculating an overall weekly weighted-average price for this combined series. The same report could be produced using live-weight price by converting dressed prices to live-weight equivalents. Composite live-weight converted prices are presented later for comparison. The values in bold in Tables 2-5 are not available in any existing or proposed USDA price report and as such are novel. We refer to these calculated prices as "values" because they are not prices paid *per se* since live prices have been converted to dressed values to combine with dressed prices.

Several data entries are important in this overall combined composite dressed report. First, the overall value is the weighted average of all qualifying transactions described in Table 1. For example, \$181.88/cwt in the combined composite dressed value in Table 2 is the overall weighted-average value that week paid for beef type cattle combining all qualifying purchases with live converted to dressed values using their individual dressing percentages recorded in the transaction. We realize some of the dressing percentages (in particular, those for live purchases) are estimated values. As such, in the table we report the weighted-average dressing percentage associated with each price calculation as well as the weighted-average percentage of cattle grading Choice or greater. Also, we directly compare and discuss dressing percentages between live and dressed purchases later in this report.

The September 5 report date (Table 2) shows a combined composite price range with the lowest 15<sup>th</sup> percentile of \$174.00/cwt to the 85<sup>th</sup> percentile value of \$188.79/cwt. We strongly recommend any such report provide a sense for price variation. As opposed to reporting simply the highest and lowest prices, we believe it is more informative to report a percentile range since we know extreme high and low prices occur for a variety of reasons unique to the

transactions. Using the 15<sup>th</sup> and 85<sup>th</sup> percentiles provides a range that encompasses approximately the middle 70% of all transactions within that range. Transactions outside of the middle 70% are certainly not in the main price trading range. Transaction prices outside the main trading range may occur because of specific attributes of the cattle that are uncommon and unknown from LMR data collected that garnered especially large premiums (e.g., naturally raised cattle; special breed types; special feed rations; etc.) or particularly large discounts (e.g., dark cutters; heavy- or light-weight carcasses; poor yield grades, etc.).

As can be discerned from the prices in Tables 2-5, most of the range in prices during any week can be associated with two major sources of price variation:

- 1) First, price variation associated with rapidly changing prices during the week – the week of September 5 illustrates this well. Because formula purchase types often have a base price tied to the prior week’s cash negotiated price, when the market price is moving rapidly, grid base prices tend to track the prior week’s negotiated cash price. Since during the week ending September 5, the cash market declined markedly (by about \$6/cwt dressed basis) relative to the prior week, we see a price spread of more than \$12/cwt between the combined weighted-average negotiated cash price of \$173.40/cwt and the grid/formula price of \$185.74/cwt. The \$12/cwt includes a combination of the \$6/cwt decline in overall cash market price since the prior week plus price differentials associated with formula purchases perhaps related to cattle quality. This type of variation is easily seen in such a report and helps one to condition our interpretation of the overall \$181.88/cwt combined composite value. This value represents the composite of recently (within the past couple of weeks) purchased, priced, and delivered cattle to the packer.
- 2) Second, price variation associated especially in the range of prices within a particular market category is also important to note. One of the significant motivations for this project, in addition to developing a composite net fed cattle value index, was also to provide clarity of better understanding the range in values observed in grid/formula price. The 15<sup>th</sup> and 85<sup>th</sup> percentile price ranges of \$180 to \$189 during the week ended September 5 or the \$162 to \$170 prices during the week ended November 14 illustrate price variation present within a week. This issue is addressed further later in this report.

<b>Table 2. Weekly Weighted Average Composite National Report (Includes Neg Cash, Formula Net, and Neg Grid Net Transactions)</b>														
<b>Report Date Monday Sept 5, 2016 (Week 35)</b>														
	<b>Combined Composite Dressed Value</b>						<b>Dressed Basis</b>				<b>Live Basis</b>			
	Value	Low 15 <sup>th</sup> %	High 85 <sup>th</sup> %	Dress	Choice +		Price	Dress	Choice +		Price	Dress	Choice +	
<b>National Market</b>	(\$/cwt)	(\$/cwt)	(\$/cwt)	%	%	Head	(\$/cwt)	%	%	Head	(\$/cwt)	%	%	Head
<b>Weighted Average</b>	<b>\$181.88</b>	<b>\$174.00</b>	<b>\$188.79</b>	<b>63.7</b>	<b>76.1</b>	<b>332,368</b>	\$183.55	63.9	76.3	245,187	\$112.11	63.3	75.7	87,181
65% or more Choice	\$181.82			63.8	81.5	270,308	\$183.71	63.9	81.7	197,851	\$111.86	63.3	80.7	72,457
Less than 65% Choice	\$182.17			63.7	52.8	62,060	\$182.87	64.0	53.4	47,336	\$113.38	63.0	50.7	14,724
<b>Cash Negotiated</b>	\$173.40	\$171.34	\$175.00	63.3	78.2	103,884	\$174.01	63.3	79.7	41,925	\$109.58	63.3	77.2	61,959
65% or more Choice	\$173.35			63.4	80.1	96,489	\$173.99	63.4	80.0	41,229	\$109.53	63.4	80.1	55,260
Less than 65% Choice	\$174.08			63.2	54.0	7,395	\$175.34	62.5	60.2	696	\$110.01	63.2	53.4	6,699
<b>Grid/Formula</b>	\$185.74	\$180.28	\$189.42	63.9	75.1	228,484	\$185.51	64.0	75.5	203,262	\$118.34	63.1	71.8	25,222
65% or more Choice	\$186.51			64.0	82.2	173,819	\$186.27	64.0	82.2	156,622	\$119.34	63.2	82.7	17,197
Less than 65% Choice	\$183.26			63.8	52.6	54,665	\$182.98	64.0	53.3	46,640	\$116.20	62.9	48.4	8,025

<b>Table 3. Weekly Weighted Average Composite National Report (Includes Neg Cash, Formula Net, and Neg Grid Net Transactions)</b>														
<b>Report Date Monday Nov 14, 2016 (Week 45)</b>														
	<b>Combined Composite Dressed Value</b>						<b>Dressed Basis</b>				<b>Live Basis</b>			
	Value	Low 15 <sup>th</sup> %	High 85 <sup>th</sup> %	Dress	Choice +		Price	Dress	Choice +		Price	Dress	Choice +	
<b>National Market</b>	(\$/cwt)	(\$/cwt)	(\$/cwt)	%	%	Head	(\$/cwt)	%	%	Head	(\$/cwt)	%	%	Head
<b>Weighted Average</b>	<b>\$165.51</b>	<b>\$161.91</b>	<b>\$168.95</b>	<b>63.7</b>	<b>75.8</b>	<b>313,132</b>	\$165.71	63.9	77.0	211,157	\$104.42	63.3	73.4	101,975
65% or more Choice	\$165.57			63.7	80.9	253,788	\$165.87	63.9	82.1	173,826	\$104.36	63.3	78.2	79,962
Less than 65% Choice	\$165.25			63.7	54.2	59,344	\$164.98	64.1	53.3	37,331	\$104.64	63.2	55.8	22,013
<b>Cash Negotiated</b>	\$163.66	\$161.00	\$166.13	63.3	77.4	108,503	\$162.09	63.5	83.7	30,660	\$103.84	63.2	74.9	77,843
65% or more Choice	\$163.44			63.3	79.5	97,755	\$162.09	63.5	83.8	30,560	\$103.72	63.2	77.6	67,195
Less than 65% Choice	\$165.62			63.2	58.1	10,748	\$163.40	63.6	60	100	\$104.61	63.2	58.1	10,648
<b>Grid/Formula</b>	\$166.49	\$162.38	\$169.68	63.9	75.0	204,629	\$166.33	64.0	75.9	180,497	\$106.29	63.4	68.3	24,132
65% or more Choice	\$166.91			64.0	81.7	156,033	\$166.68	64.0	81.8	143,266	\$107.74	63.6	81.3	12,767
Less than 65% Choice	\$165.16			63.8	53.4	48,596	\$164.98	64.1	53.3	37,231	\$104.66	63.2	53.7	11,365



## Daily Fed Cattle Composite Price

The next step in this process was to use the same methodology and qualifying transactions as in the weekly analysis above, to compute daily composite national price/value reports. Again, the objective here is to present the most comprehensive consistent price and value information current LMR data allows.

We illustrate the same types of reports as we did in the weekly data for two specific days in this example of Wednesday November 9, and Thursday November 10, 2016. The reports include transactions from the previous day's afternoon report and the report day morning report. They correspond to two of the five weekdays included in the weekly November 14 report summarized in the weekly composite section above.

Just like the weekly report, this report contains a comprehensive set of prices, price ranges, dressing percentages, Choice and greater grading represented, and number of head transacted for the trading period. We did not test these series for confidentiality as we leave that for future assessment. However, as we will discuss and present later, a 2-day rolling average of this same report would certainly be less constrained by confidentiality and as such may be the most viable way to report a daily series, albeit as a 2-day rolling weighted average. We opt not to provide the 2-day rolling average for the daily prices reported in Tables 4 and 5 in this report, as it could easily be computed from the data in these two tables. One alternative to a 2-day rolling average that has merit would be to do a 2-day tested rolling average where if a particular sale type did not have any transactions for a day, one would incorporate the last tested trade reported in the two-day so that the composite would represent recent trade in all transaction types. For example, if no negotiated trade occurred for a day, the previous day's negotiated trade would be retained and included in the 2-day composite.

The report again clearly shows the combined composite value in bold text which we consider to be the most nationally representative fed cattle value index available from current LMR data. An idea of the range of prices is also present in the daily reports. The most important numbers in Tables 4-5 again are in bold font as these are the composite values we have developed. The weighted-average \$165.71/cwt value for November 9 is the most comprehensive value available for cattle purchased recently by packers and the 15<sup>th</sup> and 85<sup>th</sup> percentile range of \$161 to \$169 illustrates the variation present in the market that day. From this report one can also quickly get a sense of price variation across *cash negotiated* relative to *grid/formula* net purchases. In particular, *grid/formula* net purchases have percentile price ranges typically 1.5 to 2 times those of *cash negotiated* prices. This is not surprising and occurs from a combination of mostly two reasons; one, *grid/formula* premium discount schedules applied to transactions increase price ranges and two, base price variation across *grid/formula* purchases can increase price variation across transactions.

<b>Table 4. Daily Weighted Average Composite National Report (Includes Neg Cash, Formula Net, and Neg Grid Net Transactions)</b>														
<b>Report Date Wednesday November 9, 2016</b>														
	<b>Combined Composite Dressed Value</b>						<b>Dressed Basis</b>				<b>Live Basis</b>			
	Value	Low 15 <sup>th</sup> %	High 85 <sup>th</sup> %	Dress	Choice +	Head	Price	Dress	Choice +	Head	Price	Dress	Choice +	Head
<b>National Market</b>	(\$/cwt)	(\$/cwt)	(\$/cwt)	%	%		(\$/cwt)	%	%		(\$/cwt)	%	%	
<b>Weighted Average</b>	<b>\$165.71</b>	<b>\$161.41</b>	<b>\$169.20</b>	<b>64.0</b>	<b>75.2</b>	<b>41,171</b>	\$165.53	64.1	76.0	36,911	\$106.15	63.4	68.5	4,260
65% or more Choice	\$166.08			63.9	82.2	30,750	\$165.92	64.0	81.9	28,983	\$107.12	63.5	86.2	1,767
Less than 65% Choice	\$164.63			64.3	54.8	10,421	\$164.12	64.5	54.5	7,928	\$105.45	63.4	55.9	2,493
<b>Cash Negotiated</b>	\$159.35	\$155.91	\$160.63	63.3	89.9	1,664	\$159.63	63.3	90.1	1,402	\$100.43	63.6	89.2	262
65% or more Choice	\$159.35			63.3	89.9	1,664	\$159.63	63.3	90.1	1,402	\$100.43	63.6	89.2	262
Less than 65% Choice														
<b>Grid/Formula</b>	\$165.98	\$162.00	\$169.24	64.1	74.6	39,507	\$165.76	64.1	75.5	35,509	\$106.52	63.4	67.1	3,998
65% or more Choice	\$166.47			64.0	81.7	29,086	\$166.24	64.0	81.5	27,581	\$108.28	63.4	85.7	1,505
Less than 65% Choice	\$164.63			64.3	54.8	10,421	\$164.12	64.5	54.5	7,928	\$105.45	63.4	55.9	2,493

<b>Table 5. Daily Weighted Average Composite National Report (Includes Neg Cash, Formula Net, and Neg Grid Net Transactions)</b>														
<b>Report Date Thursday November 10, 2016</b>														
	<b>Combined Composite Dressed Value</b>						<b>Dressed Basis</b>				<b>Live Basis</b>			
	Value	Low 15 <sup>th</sup> %	High 85 <sup>th</sup> %	Dress	Choice +	Head	Price	Dress	Choice +	Head	Price	Dress	Choice +	Head
<b>National Market</b>	(\$/cwt)	(\$/cwt)	(\$/cwt)	%	%		(\$/cwt)	%	%		(\$/cwt)	%	%	
<b>Weighted Average</b>	<b>\$167.55</b>	<b>\$162.02</b>	<b>\$171.25</b>	<b>63.4</b>	<b>74.7</b>	<b>52,002</b>	\$168.94	63.6	75.3	31,498	\$104.33	63.1	73.7	20,504
65% or more Choice	\$168.20			63.4	81.0	39,835	\$170.17	63.6	83.1	23,242	\$104.39	63.1	78.2	16,593
Less than 65% Choice	\$165.39			63.4	53.9	12,167	\$165.49	63.5	53.4	8,256	\$104.10	63.0	54.8	3,911
<b>Cash Negotiated</b>	\$163.19	\$160.47	\$165.60	63.0	76.0	14,834	\$159.01	63.4	83.5	516	\$102.85	63.0	75.7	14,318
65% or more Choice	\$163.16			63.0	76.9	14,021	\$159.01	63.4	83.5	516	\$102.82	63.0	76.6	13,505
Less than 65% Choice	\$163.64			63.2	60.0	813					\$103.45	63.2	60.0	813
<b>Grid/Formula</b>	\$169.28	\$162.71	\$171.99	63.5	74.2	37,168	\$169.11	63.6	75.2	30,982	\$107.76	63.3	69.2	6,186
65% or more Choice	\$170.94			63.6	83.3	25,814	\$170.42	63.6	83.1	22,726	\$111.26	63.6	84.9	3,088
Less than 65% Choice	\$165.52			63.4	53.4	11,354	\$165.49	63.5	53.4	8,256	\$104.28	63.0	53.5	3,098

## **Dressed vs. Live Value**

The combined composite values illustrated in the previous two sections (Tables 2-5) were calculated on a dress-weight basis. That is, live prices were converted to dressed prices by using the estimated dressing percentage reported for each transaction. We also calculated composite values converting all prices to live weight basis equivalents. We recommend potentially reporting both our combined composite values on dressed- and live-weight weighted averages and percentile ranges because each will be used by different report users. Rather than tabulate these prices here, we provide graphics of the prices in Figures 6-13. Figures 6-9 illustrate weekly values and daily values are reported in Figures 10-13. To facilitate interpretation, the figures contain the following computed value indexes for 2016 (vertical scales were maintained constant for dressed-weight (Figures 6-7, 10-11) and separately for live-weight (Figures 8-9, 12-13) to better enable comparisons):

### Weekly Values

- Figure 6 illustrates the weighted-average and minimum and maximum values on dressed-weight basis
- Figure 7 replaces the minimum and maximum from Figure 6 with the 15<sup>th</sup> and 85<sup>th</sup> percentiles
- Figure 8 is the same as Figure 6 converting all transactions to a live-weight basis
- Figure 9 is the replica of Figure 7 on a live-weight basis

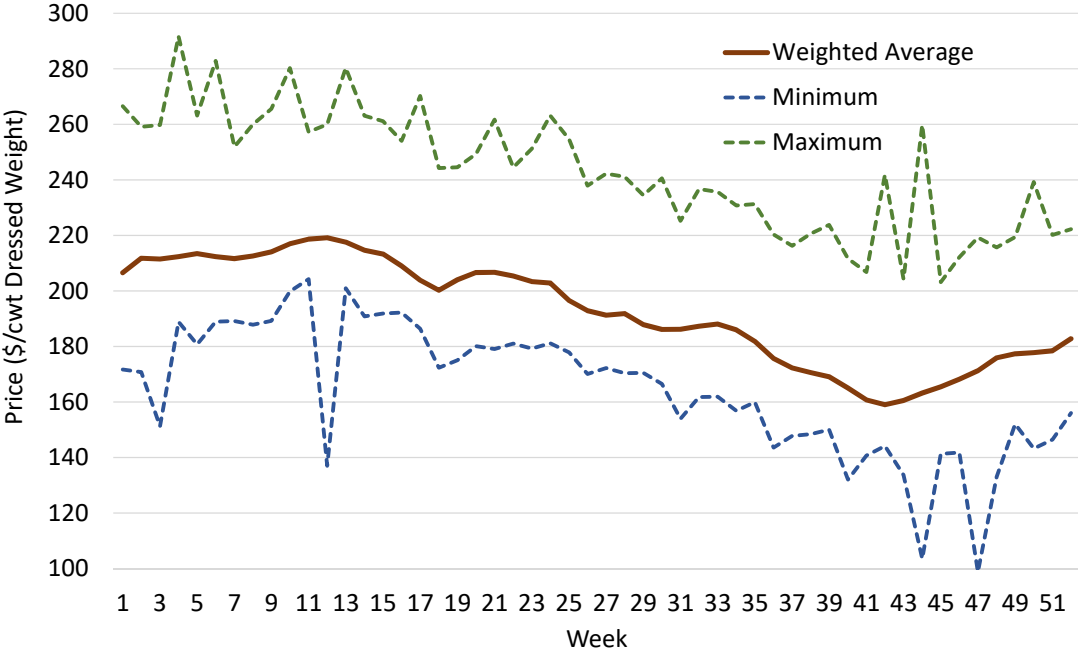
### Daily Values

- Figure 10 illustrates the weighted average and minimum and maximum values on dressed-weight basis
- Figure 11 replaces the minimum and maximum from Figure 10 with the 15<sup>th</sup> and 85<sup>th</sup> percentiles
- Figure 12 is the same as Figure 10 converting all transactions to a live-weight basis
- Figure 13 is the replica of Figure 11 on a live-weight basis

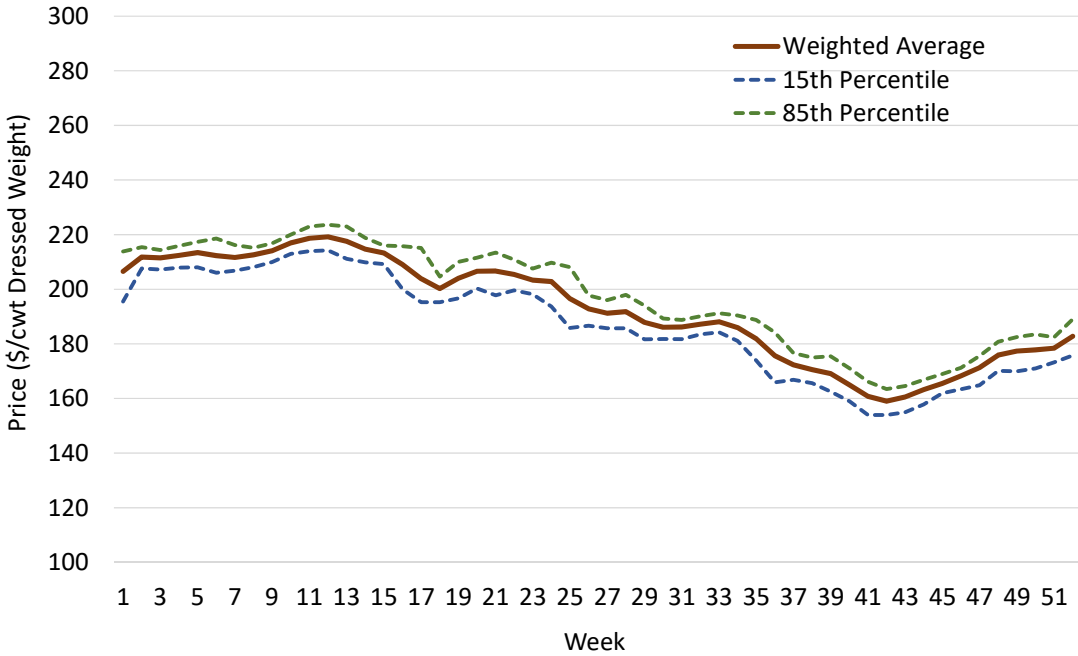
We make the following generalizations from information reported in Figures 6-13.

1. The 15<sup>th</sup> and 85<sup>th</sup> percentile value ranges are much tighter than minimum-maximum ranges illustrating more usefulness to the percentiles in price reporting.
2. Dressed-weight and live-weight prices and ranges are very similar, as expected, especially when percentiles as opposed to minimum and maximum prices are reported. We address the issue of dressing percentage in the next section.
3. As expected weekly-weighted average prices are less volatile than their daily counterparts.

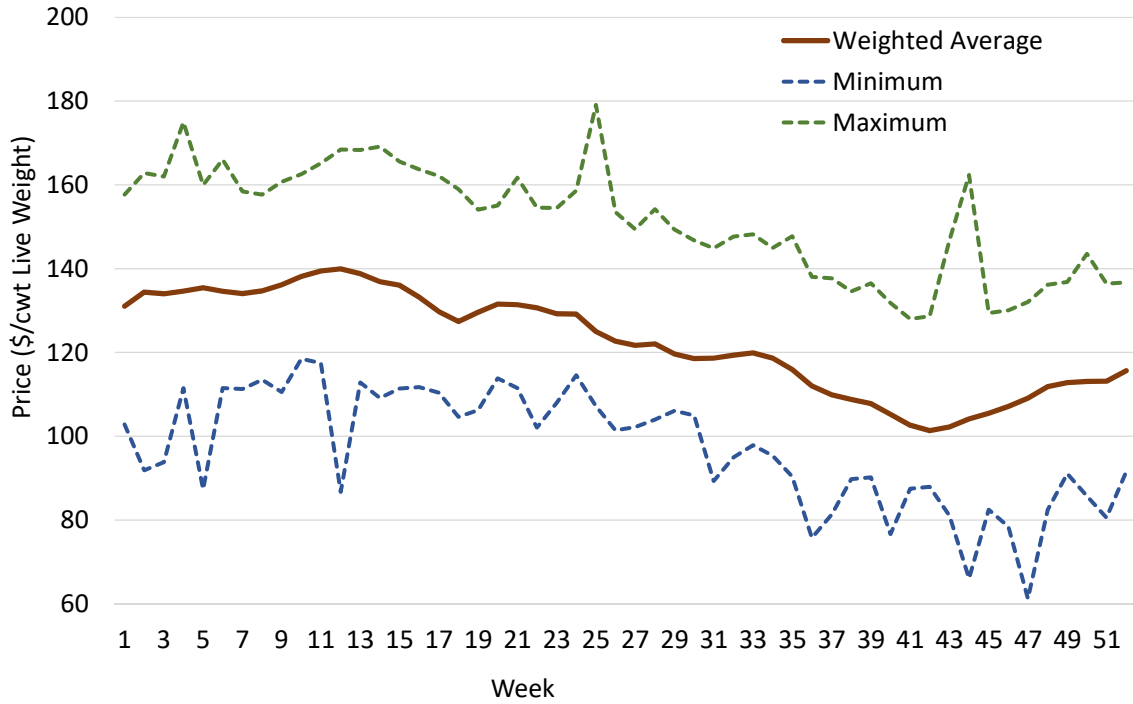
**Figure 6. Weekly Combined Composite Weighted-Average, Minimum, and Maximum Prices, Dressed-Weight Converted, 2016**



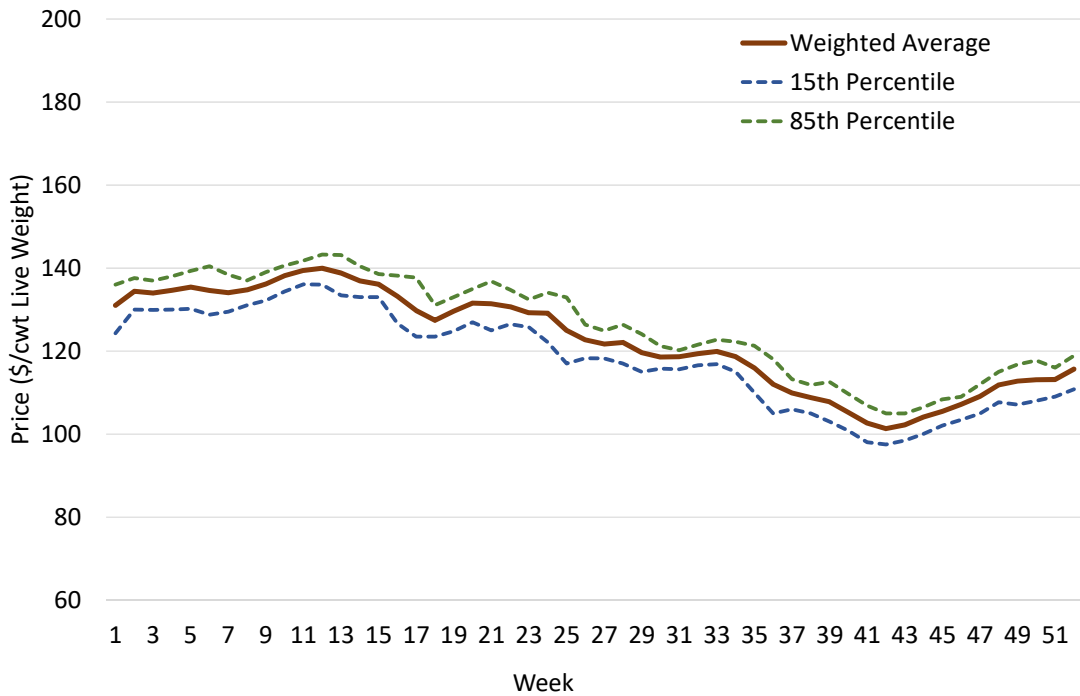
**Figure 7. Weekly Combined Composite Weighted-Average, 15th and 85th Percentile Prices, Dressed-Weight Converted, 2016**



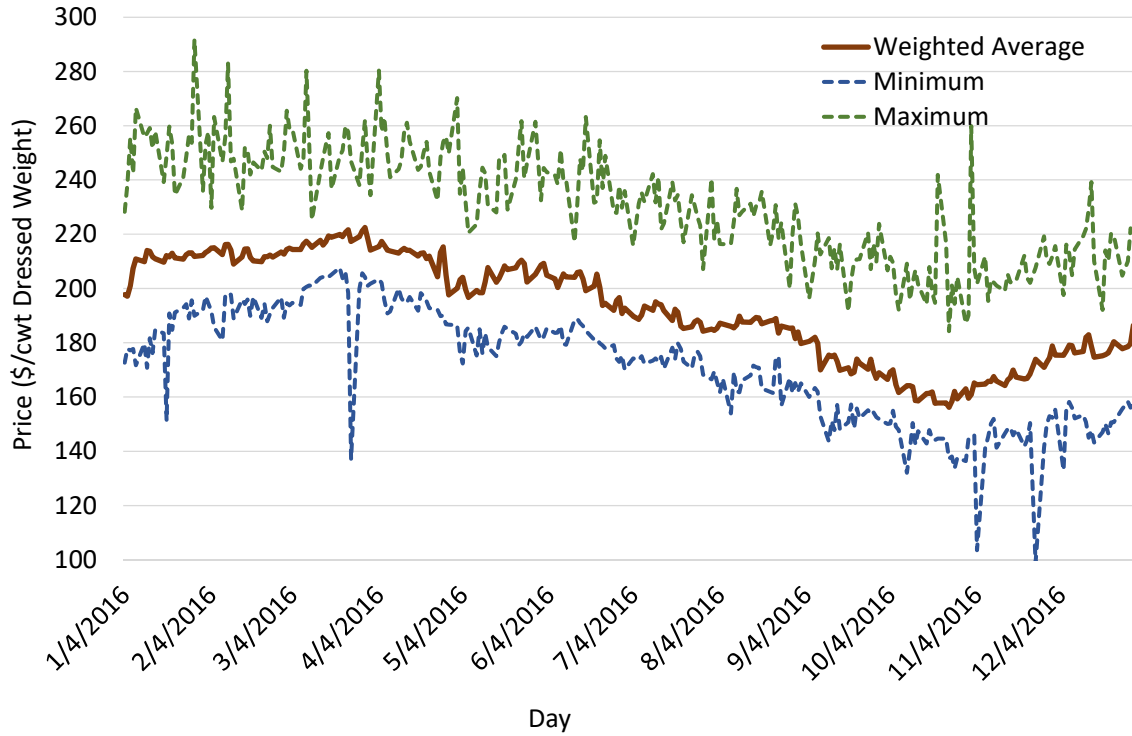
**Figure 8. Weekly Combined Composite Weighted-Average, Minimum, and Maximum Prices, Live-Weight Converted, 2016**



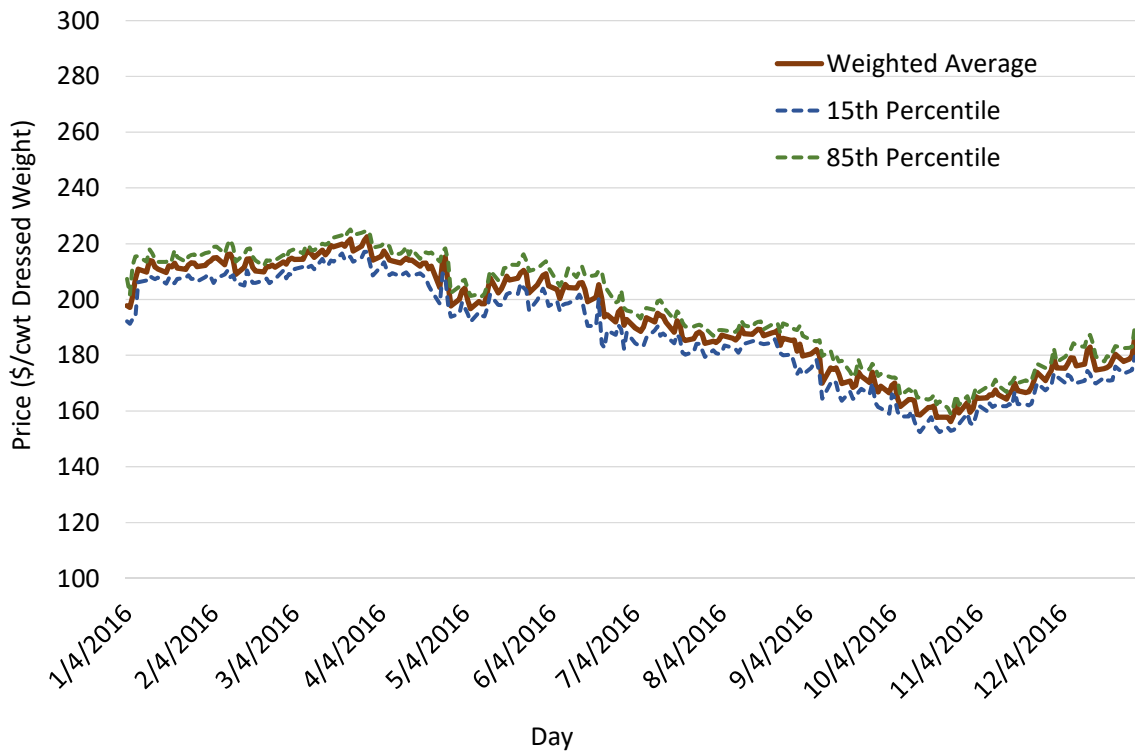
**Figure 9. Weekly Combined Composite Weighted-Average, 15th and 85th Percentile Prices, Live-Weight Converted, 2016**



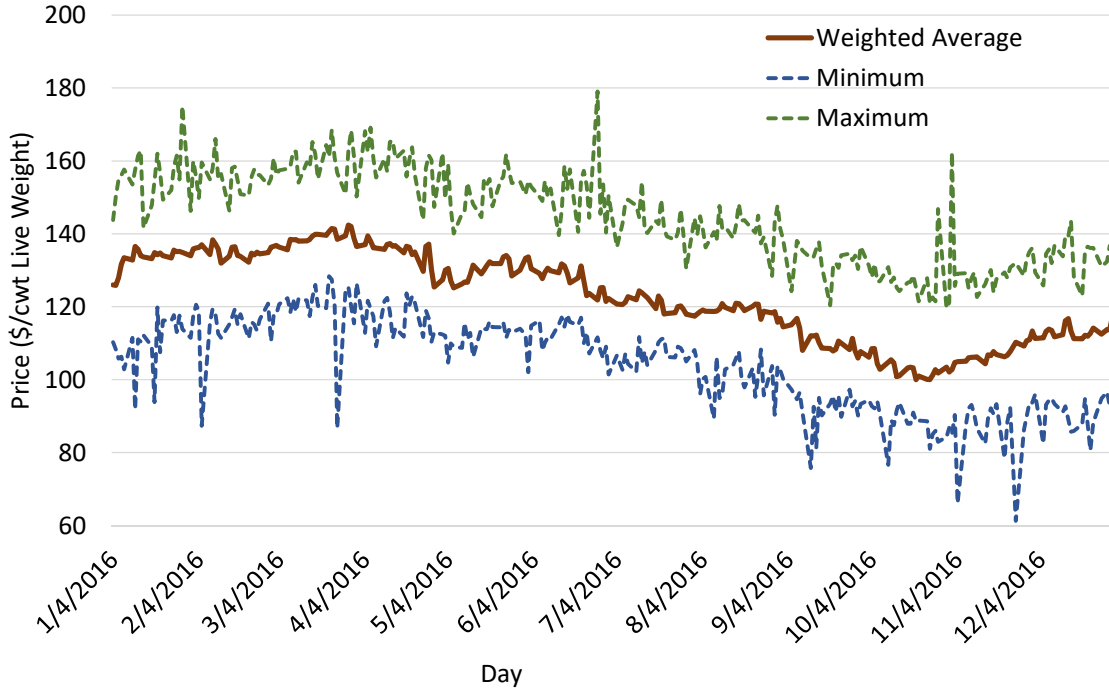
**Figure 10. Daily Combined Composite Weighted-Average, Minimum, and Maximum Prices, Dressed-Weight Converted, 2016**



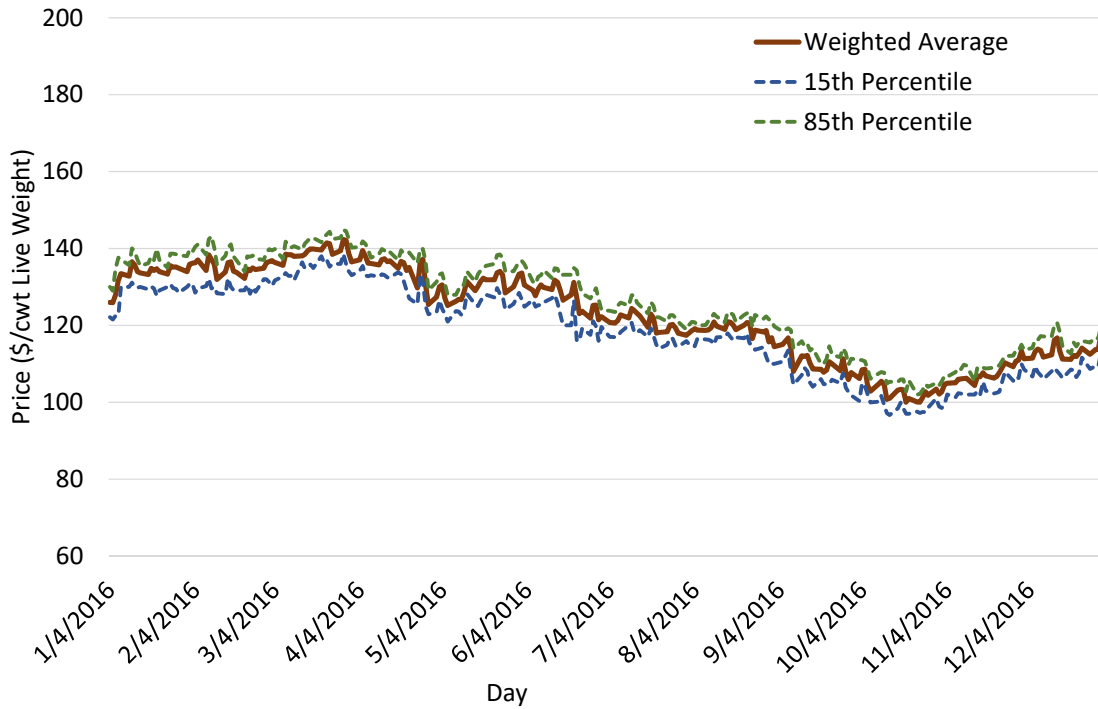
**Figure 11. Daily Combined Composite Weighted-Average, 15th and 85th Percentile Prices, Dressed-Weight Converted, 2016**



**Figure 12. Daily Combined Composite Weighted-Average, Minimum, and Maximum Prices, Live-Weight Converted, 2016**



**Figure 13. Daily Combined Composite Weighted-Average, 15th and 85th Percentile Prices, Live-Weight Converted, 2016**



## Dressing Percentage

In the composite fed cattle values presented in the previous sections we converted all live-weight prices to dressed-weight using the estimated dressing percentage reported for each respective transaction. For live-weight reports, we converted all dressed-weight prices to a live-weight basis using the reported dressing percentages for each transaction. Since in live-weight purchase transactions, dressing percentage is an estimate and not a confirmed measured value, there could be concerns that our value index when reported on a dressed basis is subject to the estimated dressing percentage being used to convert live prices to dressed values. This is a potentially legitimate concern and we offer a few thoughts here about this issue.

First, if there is concern about the estimated dressing percentage influencing dressed values, this increases the reason for reporting *both* dressed-weight composite and live-weight composite values. In this way, an easy comparison can be made and presumably the live-weight value would not be subject to dressing percentage estimation errors (since dressing percentage is known for all dressed purchases that would be converted to live weight basis) or possible manipulation that could be present in dressed-weight composites.

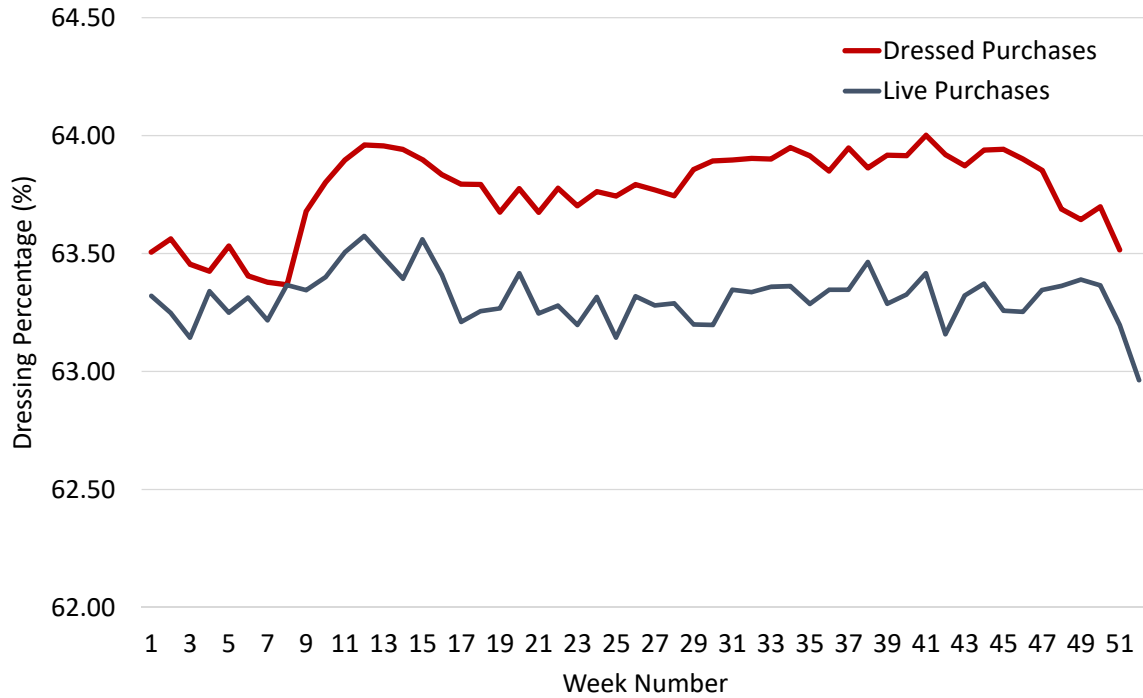
Second, to assess how dressing percentages compare across live and dressed-weight purchases, we compare the weekly and daily dressing percentages reported for 2016 for the same combined *negotiated cash, formula,* and *grid* cattle purchases that were used in the previous sections to calculate composite values. Figure 14 illustrates the weekly weighted-average dressing percentages for live and dressed purchases. The live purchases tend to have a dressing percentage that is estimated to be about 0.5% to 0.7% less than dressed purchases. This might be because of self-selection by cattle feeders who opt to sell cattle with better dressing percentage on a dressed basis. That is, those who sell cattle on a dressed basis, adjust production and marketing management to increase dressing percentage. Figure 15 is the ratio of the live divided by the dressed dressing percentages. The range in the ratio during 2016 is 1 in week 8, meaning the live and dressed transactions had the same dressing percentage, to 0.988 in week 42, meaning live dressing was 99% of dressed.

Figures 16 and 17 illustrate the dressing percentages and the ratio of live-to-dressed during 2016 similar to the weekly information in the previous two graphs. The increased variability in dressing percentage and in the ratio in daily relative to weekly data is apparent. The daily ratio ranges from 1.01 in early February to 0.98 in late April.

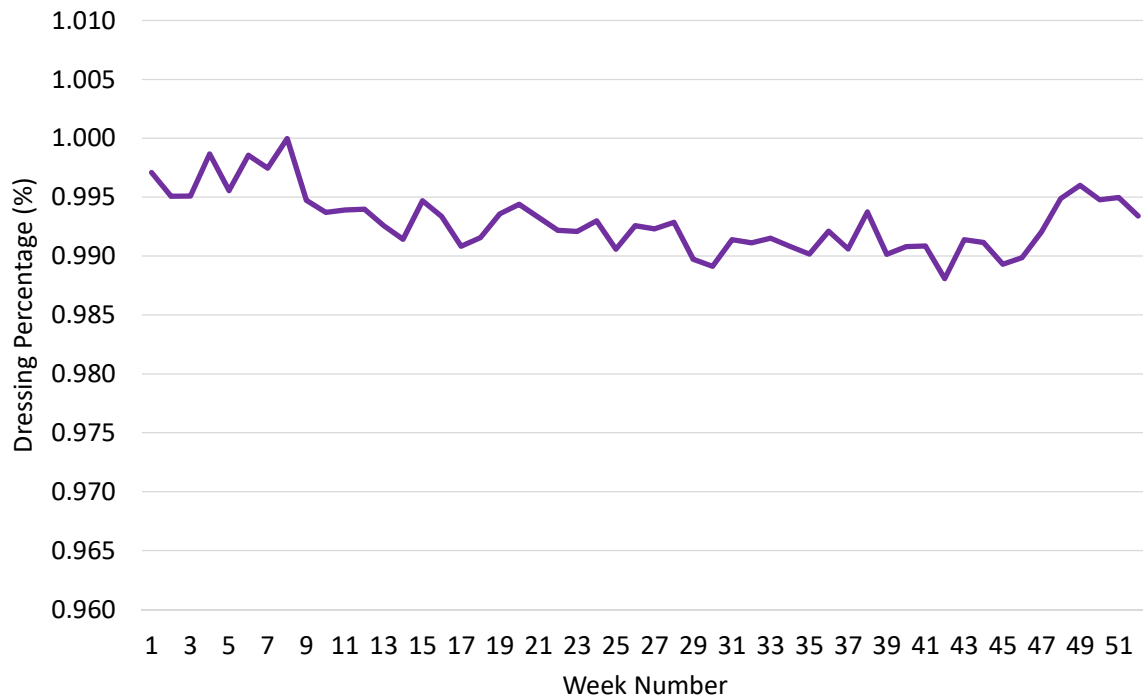
We recommend that if our composite combined dressed value report were adopted where dressed and live converted prices were combined, that the dressing percentages of live and dressed purchases be monitored. If they appear to trend or get out of line, they may need to be verified. One could envision if the goal were to reduce the composite value calculation, over-estimating dressing percentage on live purchases could contribute to that. However, an easy way to monitor is to calculate and report both live and dressed composite values each day/week that provide a direct dressing percentage comparison. Furthermore, since live purchases are the minority of transactions, it would be difficult to influence the overall composite value through manipulation of estimated dressing percentage (i.e., it would take a rather obvious over-estimation to influence the computed combined value). Nonetheless, reporting both live and dressed combined composites easily resolves this issue.



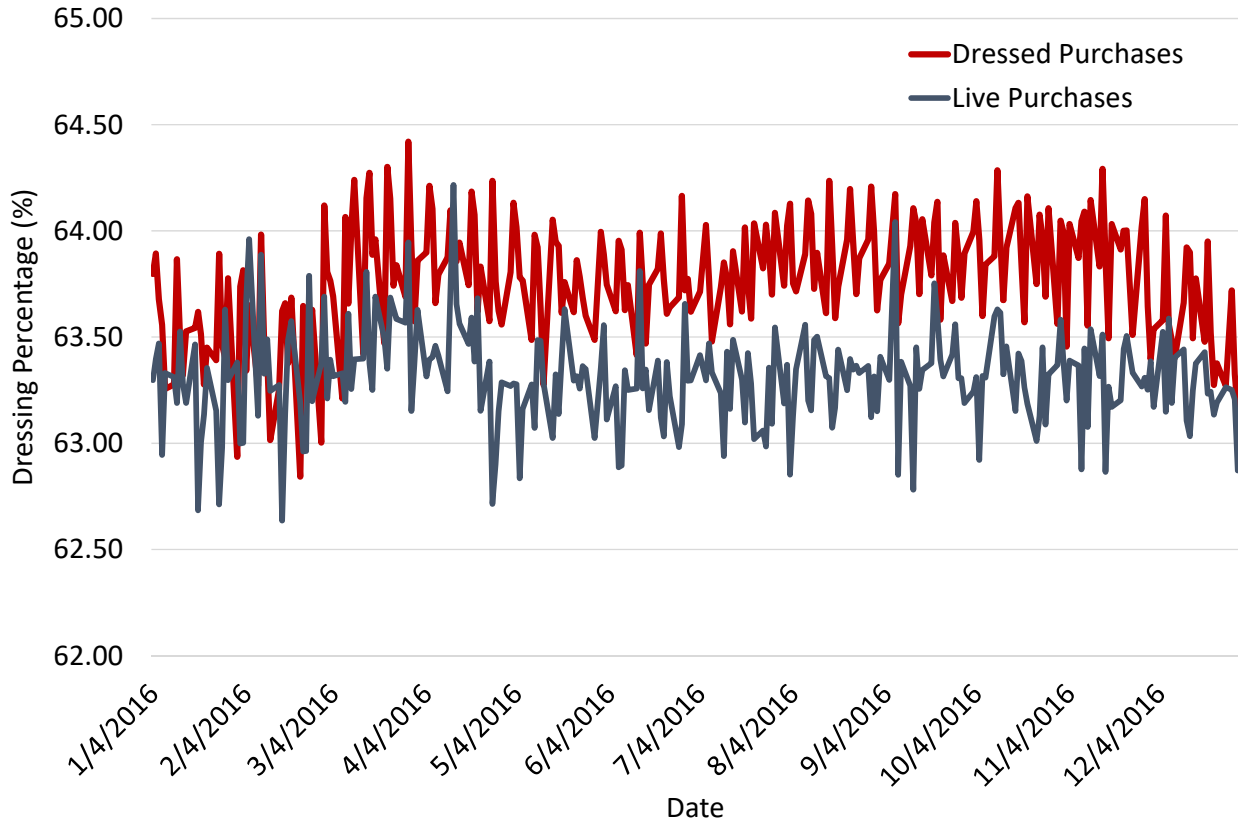
**Figure 14. Comparison of Dressed and Live Purchase Reported Dressing Percentage, Weekly Weighted Averages, 2016**



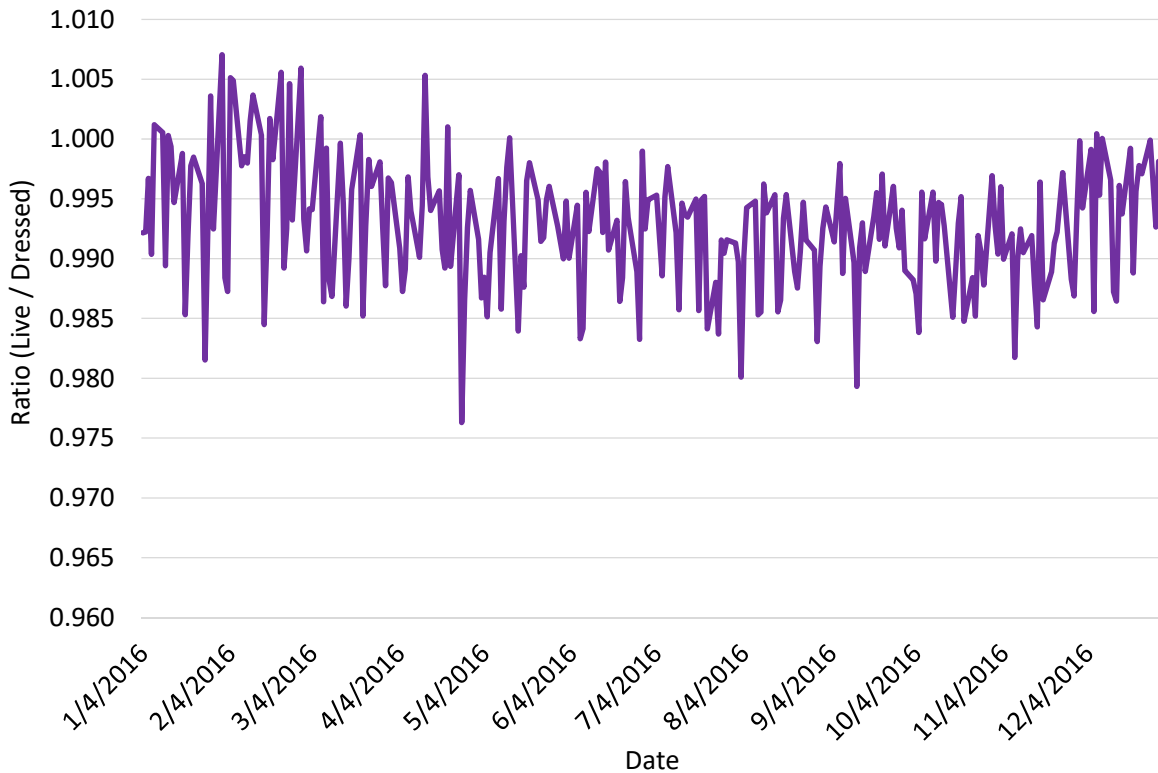
**Figure 15. Ratio of Live Relative to Dressed Purchases Dressing Percentages, Weekly Weighted Averages, 2016**



**Figure 16. Comparison of Dressed and Live Purchase Reported Dressing Percentages, Daily Weighted Averages, 2016**



**Figure 17. Ratio of Live Relative to Dressed Purchases Dressing Percentages Daily Weighted Averages, 2016**



## Models Explaining Variation in Dressed Grid/Formula Net Prices

Strong industry stakeholder desire to better understand the range in prices observed in existing net formula and grid price reports also motivates this study given the potential to leverage more information from existing LMR data. Price summary reports are desired that include both a sense of variation in weighted-average prices, but also an understanding to the extent possible, of factors contributing to and explaining the range in transaction prices for a given time frame. Often producers wish to have more information to compare grid premiums and discounts across packers or have an idea of how a particular grid compares with the general market. Results from this model would facilitate such comparisons.

The main purpose of this section of this study is to develop and test a framework for sorting out and explaining the range of transaction prices paid for fed cattle. We specifically present examples of aggregating the models to explain variation over monthly and quarterly time periods. That is, we illustrate using the individual LMR transaction data to summarize average premiums and discounts for October, November, and December of 2016 and for 4th quarter 2016 in aggregate. These types of premium discount schedules could be generated and published weekly by USDA though more work would need to be done to test the model and verify its reliability on weekly data. We did some preliminary testing on weekly data and it appears feasible to provide such information weekly. There do not appear to regularly be sufficient transactions on a daily basis to obtain reliable daily estimates.

This analysis focuses on the same qualifying transactions as noted in Table 1 with two noteworthy differences. In particular, analysis presented in this section utilizes only dressed purchases and only negotiated grid and formula net prices. As such, we drop live basis purchases and negotiated cash transactions from this analysis. The reasoning for including only negotiated grid and formula net dressed prices is that much of the range in prices within a week or day are associated with negotiated grid and formula net dressed prices. This can be seen readily in Tables 2-5 discussed in the previous section. Live basis purchases and negotiated cash purchases tend to have narrow price ranges that reflect more general market conditions on any given day because there is little value differentiation based on quality of the cattle under this marketing method. This is in large part because quality differences are difficult to discern accurately on live animals. Furthermore, the largest share of overall transactions is represented in the grid/formula dressed trade category.

Given the data available under LMR, and the inclusions or adjustments we made, our generalized fed cattle valuation model that we estimate to explain variation in dressed negotiated grid and formula transactions takes the following form:

$$(1) \text{ Price} = \beta_0 + \beta_1 \text{Heifer} + \beta_2 \text{Mixed} + \beta_3 \text{Choice} + \beta_4 \text{Weight} + \beta_5 \text{Weightsq} + \beta_6 \text{Head} \\ + \beta_7 \text{Headsq} + \beta_8 \text{RegionKS} + \beta_9 \text{RegionNE} + \beta_{10} \text{RegionIA} + \beta_{11} \text{RegionTX} + \varepsilon$$

The variables in (1) are defined in Table 6. Subscripts for transaction  $i$  are omitted from (1) for convenience and  $\varepsilon$  is a random error. Also, binary variables are added to the model for each day of the month or quarter the model is estimated to allow the model to adjust to general market price changes each day. As such, the estimated premiums or discounts for lot attributes estimated in this fashion are adjusted for daily overall market price changes. The models were estimated using weighted-least-squares regression with *Head* as the weight in weighted-least-squares estimation.

The model can be used to provide an average value matrix for cattle over the month or quarter. If done on a weekly basis, the model can be estimated as soon as data are reported to AMS just like current weighted-average price reports are prepared and published. The way the model is used to provide a value estimate is

the model is estimated using transactions data from LMR for each period of interest (e.g., week, month, quarter) which provides estimates of the coefficients in the model. The coefficients provide estimates of value differentials relative to the default transaction of *Steers* from a feedlot located in a state other than the four market regions listed in Table 6.

**Table 6. Variables used in Regression Pricing Model**

Variable	Description
<i>Price</i>	Net price of lot on dressed weight basis for grid/formula purchases (\$/cwt)
<i>Steer</i> (Default)	1 if lot is steers, 0 otherwise
<i>Heifer</i>	1 if lot is heifers, 0 otherwise
<i>Mixed</i>	1 if lot is mixed steers/heifers, 0 otherwise
<i>Choice</i>	Percentage of Choice or higher grade in lot (%)
<i>Weight</i>	Average weight of animals in lot (dressed lbs/head)
<i>Weightsq</i>	<i>Weight</i> squared
<i>Head</i>	Number of head in transaction
<i>Headsq</i>	<i>Head</i> squared
<i>RegionKS</i>	1 if lot origin is KS market region, 0 otherwise
<i>RegionNE</i>	1 if lot origin is NE market region, 0 otherwise
<i>RegionIA</i>	1 if lot origin is IA/MN market region, 0 otherwise
<i>RegionTX</i>	1 if lot origin is TX/NM/OK market region, 0 otherwise

## Data

Summary statistics of data used to estimate and illustrate the use of the regression model for explaining variation in formula net and negotiated grid net transactions reported for 2016 are summarized in Table 7. The weighted average net dressed price was \$191.84/cwt. Formula transactions represent 94%, and negotiated grid 6% of the head-weighted transactions. Transactions with steers only comprised 60% of the head-weighted lots. Overall the weighted-average percentage grading Choice and greater was 74.8%. Weighted-average carcass weight was 871 lbs. and average number of head per transaction was 176.

**Table 7. Head-Weighted Summary Statistics of Data, 2016**

Variable	Weighted Mean	Unweighted Std Dev	Minimum	Maximum
<i>Price (\$/cwt)</i>	191.84	19.77	98.8	263.07
Domestic Purchases (%)	99.1	9.4		
Imports (%)	0.9	9.4		
<i>Formula Purchase</i>	94.0	23.7		
<i>Negotiated Grid Purchase</i>	6.0	23.7		
<i>Steer (%)</i>	59.9	49.0		
<i>Heifer (%)</i>	29.0	45.4		
<i>Mixed (%)</i>	11.1	31.4		
<i>Choice (%)</i>	74.8	16.3	0	100
<i>Weight</i>	871	74	529	1,231
<i>Head</i>	176	121	11	1,352
<i>RegionKS (%)</i>	24.9	43.2		
<i>RegionNE (%)</i>	16.4	37.1		
<i>RegionIA (%)</i>	4.6	20.9		
<i>RegionTX (%)</i>	31.8	46.6		
Total Transactions	82,564			

## Regression Use Illustration

This section summarizes the usefulness of the regression output under this approach. The first set of regressions used data for October, November, and December 2016 separately for each month and the last regression model uses data for the entire 4<sup>th</sup> quarter of 2016 combined. The information summarized in Table 8 was calculated directly from the estimated regression models.

Carcass weight is the first segment of price differentials presented. The base carcass weight was selected as near the average of 870 lbs at 900 lbs. Overall, for the 4<sup>th</sup> quarter, a pen of cattle with an average 1,000 lb carcass received a \$2.66/cwt discount during the quarter relative to the base lot with an average of 900 lb carcass. A lot with a 700 lb average carcass was discounted \$0.71/cwt relative to a pen averaging 900 lbs. Lots with an average of 800 lb carcasses were on about par, or small premium, relative to lots having 900 lb average carcasses. LMR data do not provide the number of head in a pen that are either considered light-weight or heavy-weight carcasses subject to discounts by packers. As such, the estimated premium or discount associated with an average carcass weight of the pen likely embeds higher incidence of light-weight discounts on 600 lb carcass lots and heavy-weight discounts on 1,100 lb carcass lots.

Transactions with 90% Choice or higher quality grade received a \$2.67/cwt premium and a 40% Choice received a \$4.00/cwt discount to the base 70% Choice lot during the 4<sup>th</sup> quarter 2016. The Choice-to-Select spread implied from the regression model is \$13.33/cwt, which corresponds closely with the average Choice-to-Select spread calculated from the USDA boxed beef cutout values for the 4<sup>th</sup> quarter 2016 of \$13.32/cwt. The consistency of these estimates lends credence to the regression modeling approach and specification used here to estimate carcass premiums and discounts for individual carcass traits.

Regional price differences are also presented in Table 8. Overall for the 4<sup>th</sup> quarter of 2016, KS delivered negotiated grid and formula carcass cattle received a \$0.39 premium to other regions, whereas, NE received a \$0.48/cwt discount and IA a \$2.09/cwt discount. Heifers and mixed pens of heifers and steers received roughly \$0.50/cwt discounts relative to steers. Larger transactions received premiums to smaller transactions with 300 head receiving \$0.68/cwt premium to transactions with 100 head overall for the 4<sup>th</sup> quarter of 2016.

A cautionary point is in order in using regression models such as the ones presented here for reporting more details on price premiums and discounts being paid by packers across transactions. First, the regressions are only as reliable as the underlying data that are available to estimate them. In the case of LMR data since we do not have data on many important grid pricing determinants, such as percentage of light- or heavy-weight carcasses in the lot, yield grade distribution, or percentage grading Prime or qualifying for branded programs, we cannot estimate premiums or discounts for these attributes. Instead the premiums or discounts for such non-reported attributes end up being embedded in other estimates if they are correlated with them (e.g., percentage Choice is likely positively correlated positively with percentage Prime). More data on specific grid determinants in each transaction would improve reliability of such modeling efforts. Second, regression models such as these are sensitive to selection of variables to include in the model, the functional form of the model, and number of observations and reliability of data used in the model. As such, though we believe the models estimated here are useful for illuminating some of the price variation in negotiated grid and formula trade net prices, we recommend more testing be done on these types of models before they are adapted for price reporting purposes.

**Table 8. Illustrative use of Regression Estimates to Explain Formula and Negotiated Grid Dressed Price Variation, October, November, December, and 4th Quarter, 2016 (all estimates \$/cwt carcass weight)**

	October	November	December	4th Quarter
<b>Carcass Weight (lbs)</b>				
600	-\$0.41	-\$4.32	-\$6.86	-\$4.08
700	\$1.05	-\$0.76	-\$2.11	-\$0.71
800	\$1.18	\$0.68	\$0.18	\$0.65
900	BASE	BASE	BASE	BASE
1000	-\$2.50	-\$2.80	-\$2.65	-\$2.66
1100	-\$6.32	-\$7.71	-\$7.76	-\$7.33
<b>Choice or Higher (%)</b>				
30	-\$4.91	-\$5.15	-\$6.15	-\$5.33
40	-\$3.68	-\$3.86	-\$4.61	-\$4.00
50	-\$2.46	-\$2.58	-\$3.07	-\$2.67
60	-\$1.23	-\$1.29	-\$1.54	-\$1.33
70	BASE	BASE	BASE	BASE
80	\$1.23	\$1.29	\$1.54	\$1.33
90	\$2.46	\$2.58	\$3.07	\$2.67
100	\$3.68	\$3.86	\$4.61	\$4.00
<b>Regional Markets</b>				
KS	-\$0.58	\$0.47	\$1.33	\$0.39
NE	-\$0.10	-\$0.35	-\$1.12	-\$0.48
IA	-\$2.91	-\$1.81	-\$1.56	-\$2.09
TX	-\$0.26	\$0.84	\$2.18	\$0.83
Other	BASE	BASE	BASE	BASE
<b>Animal Class</b>				
Steer	BASE	BASE	BASE	BASE
Heifer	-\$1.07	-\$0.51	-\$0.11	-\$0.57
Mixed	-\$0.75	-\$0.14	-\$0.54	-\$0.46
<b>Head</b>				
100	BASE	BASE	BASE	BASE
300	\$0.26	\$0.67	\$1.21	\$0.68
500	\$1.19	\$1.57	\$3.12	\$1.88

## Final Thoughts

This report provides an illustration of additional information that could be reported for fed cattle under existing LMR data collection procedures. Relative to existing reports USDA publishes, we have accomplished the following:

1. We illustrated how much volume of cattle could be represented in daily and weekly fed cattle price summary combining negotiated cash, negotiated grid, and formula net transactions into a composite report.
2. We developed a combined composite fed cattle value index that combines dressed and live prices for negotiated cash, negotiated grid net, and formula net prices for steers, heifers, and mixed steer/heifer transactions. We illustrated feasibility of accomplishing this and an example of the resulting daily, and weekly price reports that could be generated. We also note a 2-day rolling report might be preferred to a daily report as it would include more transactions. However, a 2-day rolling report can lag when prices are rapidly changing.
3. We demonstrated use of percentiles instead of price ranges for high and low to report price variation.
4. We illustrated why including forward contract net prices in a composite fed cattle price summary is of concern.
5. We developed and illustrated using regression models to inform price variation in monthly and quarterly dressed prices for formula and negotiated grid transactions is feasible and could help to inform factors contributing to observed price variation. Such information provides producers selling on a grid with a baseline to determine how premiums and discounts received compare with the general market. We are not able to fully explain differences in the full range of prices observed in part because of important data that are not available on transactions that we know affect net prices. Information that could be used to further explain price ranges is not part of LMR data collection such as percentage Prime, CAB; yield grade distributions; dark cutters; and light and heavy-weight carcass prevalence. Having these data would further inform the price range observed, but exactly how much cannot be determined without data to test. The point is, our models can only explain price ranges based on data that are available in LMR and limits to further data detail limits explanatory power. This point could be re-considered if additional information became available in LMR data. Finally, we recommend closer examination of feasibility of using this type of modeling to report more frequent premium/discount data from negotiated grid and formula net transactions. Such information is important for industry users to better understand and interpret observed ranges in prices paid.